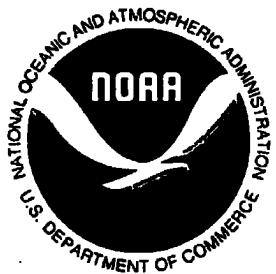


**NOAA NESDIS**  
**CENTRAL SATELLITE DATA PROCESSING CENTER**

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**High-Resolution Infrared Radiation  
Sounder (HIRS) Level 1b Format  
Specification for NOAA-N and the IJPS Era**

**Final Draft**

**June 13, 2003**



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HIRS

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## 1 Introduction

This document describes the HIRS Level 1b format for the IJPS era, which includes the NOAA-N/N' satellites and the Metop satellites. It provides Level 1b format specifications for the primary header record and the data record. Please note that as part of the updates to the Level 1b formats for NOAA-N and the IJPS era is the inclusion of additional, or secondary, header records. They will contain ancillary data set names and any metadata needed for, primarily, reprocessing. Currently, the content and format of any secondary header record is TBD.

Applications that will access HIRS Level 1b data sets should use the "Count of Header Records in this Data Set" field, located in the first, or primary, header record, to calculate the position of the first data record and skip the secondary header records.

## 2 Applicable Documents

Table 1 presents a list of applicable documents (AD-#).

Doc #	Title	Reference Number	Issue	Date
AD-1	TIROS-N Unique Interface Specification for the HIRS/2	IS2285780	R	June 15, 2000
AD-2	HIRS/4 Instrument Interface Control Document	MO-JC-MMT-HI-0001	4, rev. 0	January 2001
AD-3	<u>NOAA KLM User's Guide</u>			Sept. 2000

Table 1 - Applicable Documents

## 3 Data Representation and Storage

This section describes the bit and byte numbering conventions used in this document, and the storage methods for integers and floating point numbers. This information is especially critical when transporting data from one computer architecture to another. Without special handling, data produced on one system may be unusable on another due to differences in internal data storage.

### 3.1 Bit Numbering

A byte in this document is defined as containing 8 bits. A word is 8, 16, or 32 bits in length. In all cases, the least significant bit (lsb) is designated as bit 0 and has a base-10 value of  $2^0 = 1$ . Therefore, in an 8-bit word the most significant bit (msb) is designated as bit 7, and has a base-10 value of  $2^7 = 128$ . In a 16-bit word the msb is designated as bit 15, and has a base-10 value of  $2^{15} = 32,768$ . In a 32-bit word the msb is designated as bit 31, and has a base-10 value of  $2^{31} = 2,147,483,648$ .

### 3.2 Signed Integers

For signed binary integers, the msb represents the sign of the number. The remaining bits (bits 6 through 0 for 8-bit words, 14 through 0 for 16-bit words, and 30 through 0 for 32-bit words) are used to designate the magnitude of the number. Therefore, the range of signed binary integers is based on word size as follows:

- 1 byte -128 to 127

- 2 bytes -32,768 to 32,767
- 4 bytes -2,147,483,648 to 2,147,483,647

Positive binary integers are in true binary notation with the sign bit set to zero. Negative binary integers are in two's-complement notation with the sign bit set to one. Negative binary integers are formed in two's-complement notation by inverting each bit of the positive binary integer and adding one.

### **3.3 Unsigned Integers**

Unsigned binary integers use all bits including the msb to represent the magnitude of the number. Therefore, their range is as follows, again, based on word size:

- 1 byte 0 to 255
- 2 bytes 0 to 65,535
- 4 bytes 0 to 4,294,967,295

A field containing a binary integer is given the data type of unsigned integer if its content will never be negative or if a negative value just does not make sense for that field. For example, the idea of a negative scan line number or negative date or time is nonsensical. Therefore, fields containing scan line numbers, dates, and times are labeled as unsigned integers.

Unfortunately, this data type is not supported by all computer languages (e.g., FORTRAN), so additional data manipulation may be necessary. In the case of reading a 16-bit unsigned integer (DATA), a FORTRAN user could use the following code snippet to extract the actual value (VALUE):

```
...
INTEGER*2 DATA
INTEGER*4 VALUE
...
READ DATA
IF (DATA .LT. 0) THEN
    VALUE = 65536 + DATA
ELSE
    VALUE = DATA
ENDIF
...
```

But note that nearly all unsigned integer fields can be safely read into signed integer data types of the same word sizes. This is because they were originally written to the 1b using signed integer data types, and thus will be within the positive range of the corresponding signed integer data type (see Section 3.2). The 1b format specifications will clearly indicate, by providing ranges, those unsigned integer fields that must be strictly treated as unsigned integer data types--using the data manipulation described above, if necessary--to ensure that correct values are retrieved.

However, not all fields of an unsigned integer data type contain unsigned binary integers. Fields containing *packed data* are also identified as unsigned integers. While its msb is not a sign bit, a field containing packed data does not represent an unsigned binary integer. Such a field requires the user to perform some type of special unpacking technique in order to extract the information of interest from the field in order for it to be interpreted correctly. Packed data may be bit fields, packed integers, or both. A bit field is one or more consecutive bits used to indicate one of two or more possible conditions or states. (A *bit flag* is a specialized instance of a bit field. It is a single bit indicating one of only two possible conditions.) For example, a three-bit field may indicate which of seven different modes that an instrument is operating in (i.e., 0 implies "power on mode", 1 implies "warm up mode", 2 implies "standby mode", etc.). A packed integer is simply a binary number that is stored in just a subset of an unsigned integer field's bits. Although similar to a bit field, a packed integer is not an indicator of a condition, but an actual numeric value having magnitude that, once unpacked, could be used in arithmetic computations.

Add

### 3.4 Scaled Integers

To provide maximum portability of the Level 1b data sets across different computer platforms, floating point data is represented by scaled integers. Scaled integers can be either signed or unsigned, and are simply floating point numbers multiplied by a fixed scaling factor so that a sufficiently precise representation of the original number can be stored in integer form. For example, the floating point value 1.2313 might be multiplied by  $10^2$  to achieve an integer value of 123. To achieve better precision, the floating point value might be multiplied by  $10^3$  or  $10^4$  to achieve an integer value of 1231 or 12313, respectively. In the Level 1b data sets, the scaling factors are powers of ten, and only the exponents (2, 3, and 4 in the previous examples) are documented within the data set. To recover an approximation of the original floating point value, divide the integer value by ten raised to the given exponent.

### 3.5 Byte Ordering

A major problem impeding the free transport of binary data from one computer system to another is the "Big Endian - Little Endian" dichotomy. *Big Endian* systems (e.g. IBM 370, Macintosh, SGI, Sun SPARC) store bytes of binary numeric data in reverse order relative to *Little Endian* systems (e.g. IBM PC, DEC Alpha). For example, a 32-bit hexadecimal value of x01020304 (decimal value 16,909,060) written to a binary file by a Big Endian system would be read from the file as x04030201 (decimal value 67,305,985) by a Little Endian system. Level 1b data sets generated and archived by NOAA are in Big Endian order; users with Little Endian systems must include an additional byte-swapping step when reading binary numeric data from Level 1b data sets produced by NOAA. Some processors support byte swapping in their instruction sets, but others must use compiler-dependent functions.

## 4 HIRS Level 1b Format Specifications

The format specifications for the HIRS Level 1b header record and HIRS Level 1b data record are given in this section. The meaning of each column in the format specifications is defined in Table 2.

Name	Description
Field Name	The name or brief description of the field.
Start Octet	Offset location of first octet in the defined field from beginning of record, starting with octet 1. (Note that the terms "octet" and "byte" are used interchangeably and mean the same thing.)
End Octet	Offset location of last octet in the defined field from beginning of record.
Data Type	Data Type (i - integer, u - unsigned integer, c - character). Character data is stored as ASCII.
Word Size	Number of octets per data word.
Number of Words	Number of words of indicated size and type contained in the defined field.
Scale Factor	Scaling Factor.
Units	The field's unit of measurement (e.g., octets, counts, Kelvin, volts), if applicable.
Notes	References to notes that follow the format specifications in Section 5.

Table 2 - Description of Format Specification Columns

## 4.1 HIRS 1b Primary Header Record Format

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<b>FILE IDENTIFICATION</b>								
Data Set Creation Site ID CMS=Centre de Meteorologie Spatiale/France DSS=Dundee Satellite Receiving Station/UK NSS=National Environmental Satellite, Data and Information Service/USA UKM=United Kingdom Meteorological Office/UK	1	3	c	3	1	0		
<ASCII blank = x20>	4	4	c	1	1	0		
Level 1b Format Version Number	5	6	u	2	1	0		
Level 1b Format Version Year (e.g., 2000)	7	8	u	2	1	0		
Level 1b Format Version Day of Year (e.g., 365)	9	10	u	2	1	0		
<Reserved for Logical Record Length> (For Creation Site use only. Logical Record Length of source 1b data set prior to processing.)	11	12	u	2	1	0	octets	
<Reserved for Block Size> (For Creation Site use only. Block Size of source 1b data set prior to processing.)	13	14	u	2	1	0	octets	
Count of Header Records in this Data Set	15	16	u	2	1	0		
<Zero Fill>	17	22	i	2	3	0		
Data Set Name	23	64	c	42	1	0		
Processing Block Identification	65	72	c	8	1	0		
Spacecraft Identification Code 7=NOAA-N NOAA-N' 8=Metop-1 <TBC> 12=Metop-2 <TBC> 13=Metop-3 <TBC> 14=Metop simulator <TBC>	73	74	u	2	1	0		
Instrument ID 304=s/n H304 (NOAA-N') 305=s/n H305 (NOAA-N) 306=s/n H306 (Metop-2) 307=s/n H307 (Metop-1)	75	76	u	2	1	0		
Data Type Code 5=HIRS	77	78	u	2	1	0		
TIP Source Code (NOAA: values defined below) or <Zero Fill> (Metop)	79	80	u	2	1	0		
0=unused, i.e., GAC/HRPT/LAC data 1=GAC-embedded AMSU and TIP 2=stored TIP (STIP) 3=HRPT/LAC-embedded AMSU and TIP 4=stored AIP (SAIP)								
Start of Data Set Day Count starting from 0 at 00h, 1 Jan 1950	81	84	u	4	1	0		
Start of Data Set Year (four digits, e.g., 2000)	85	86	u	2	1	0		
Start of Data Set Day of Year (e.g., 365)	87	88	u	2	1	0		
Start of Data Set UTC Time of Day	89	92	u	4	1	0	milliseconds	
End of Data Set Day Count starting from 0 at 00h, 1 Jan 1950	93	96	u	4	1	0		
End of Data Set Year (four digits, e.g., 2000)	97	98	u	2	1	0		
End of Data Set Day of Year (e.g., 365)	99	100	u	2	1	0		
End of Data Set UTC Time of Day	101	104	u	4	1	0	milliseconds	
Year of Last CPIDS Update (four digits, e.g., 2000)	105	106	u	2	1	0		
Day of Year of Last CPIDS Update (e.g., 365)	107	108	u	2	1	0		
<Zero Fill>	109	116	i	2	4	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<b>DATA SET QUALITY INDICATORS</b>								
Instrument Status ( <i>These are bit flags taken from the Digital B Data field on first data record.</i> )	117	120	u	4	1	0		
bits 31-16: <zero fill>								
bit 15: instrument power (0=off; 1=on)								
bit 14: electronics power (0=off; 1=on)								
bit 13: filter motor power (0=off; 1=on)								
bit 12: scan motor power (0=off; 1=on)								
bit 11: cooler heater (0=off; 1=on)								
bit 10: filter housing heater (0=off; 1=on)								
bit 9: cooler door release (0=disabled; 1=enabled)								
bit 8: cooler window heater (0=on; 1=off)								
bit 7: go to nadir position (0=no; 1=yes/initiated)								
bit 6: calibration sequence (0=disabled; 1=enabled)								
bit 5: cooler door closed (0=yes; 1=no)								
bit 4: cooler door fully open (0=yes; 1=no)								
bit 3: filter motor power level (0=normal; 1=high)								
bit 2: patch temperature controller (0=off; 1=on)								
bits 1-0: <zero fill>								
<Zero Fill>	121	122	i	2	1	0		
Record Number of Status Change ( <i>if 0, none occurred</i> )	123	124	u	2	1	0		
Second Instrument Status ( <i>if previous word is 0, no change</i> )	125	128	u	4	1	0		
Count of Data Records in this Data Set	129	130	u	2	1	0		
Count of Calibrated, Earth Located Scan Lines in this Data Set	131	132	u	2	1	0		
Count of Missing Scan Lines	133	134	u	2	1	0		
Count of Data Gaps in this Data Set	135	136	u	2	1	0		
Count of Data Frames Without Frame Sync Word Errors ( <i>NOAA</i> ) or <Zero Fill> ( <i>Metop</i> )	137	138	u	2	1	0		
Count of PACS Detected TIP Parity Errors ( <i>NOAA</i> ) or <Zero Fill> ( <i>Metop</i> )	139	140	u	2	1	0		
Sum of All Auxiliary Sync Errors Detected in the Input Data ( <i>NOAA</i> ) or <Zero Fill> ( <i>Metop</i> )	141	142	u	2	1	0		
Time Sequence Error 0=none; otherwise, the record number of the first occurrence	143	144	u	2	1	0		
Time Sequence Error Code ( <i>These are bit flags taken from Scan Line Quality Flags [Time Problem Code] on data record reported in Time Sequence Error field above. If a bit is on (=1) then the statement is true.</i> )	145	146	u	2	1	0		
bits 15-8: <zero fill>								
bit 7: time field is bad but can probably be inferred from the previous good time								
bit 6: time field is bad and can't be inferred from the previous good time								
bit 5: this record starts a sequence that is inconsistent with previous times (i.e., there is a time discontinuity); may be associated with a spacecraft clock update								
bit 4: start of a sequence that apparently repeats scan times that have been previously accepted								
bits 3-0: <zero fill>								
SOCC Clock Update Indicator 0=none during this orbit; otherwise, the record number of the first occurrence	147	148	u	2	1	0		
Earth Location Error Indicator 0=none during this orbit; otherwise, the record number of the first occurrence	149	150	u	2	1	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Earth Location Error Code (These are bit flags taken from Scan Line Quality Flags [Earth Location Problem Code] on data record reported in Earth Location Error Indicator field above. If a bit is on (=1) then the statement is true.) bits 15-8: <zero fill> bit 7: not earth located because of bad time; earth location fields zero-filled bit 6: earth location questionable: questionable time code (see time problem flags above) bit 5: earth location questionable: marginal agreement with reasonableness check bit 4: earth location questionable: fails reasonableness check bits 3-2: <zero fill> bit 1: not earth located because of satellite in-plane maneuver (Metop) or <zero fill> (NOAA) bit 0: not earth located because of satellite out-of-plane maneuver (Metop) or <zero fill> (NOAA)	151	152	u	2	1	0		
PACS Status Bit Field (NOAA: value defined below) or <Zero Fill> (Metop) bits 15-3: <zero fill> bit 2: pseudonoise (0=normal data; 1=pseudonoise data) bit 1: tape direction (0=reverse playback, time decrementing) bit 0: data mode (0=test data; 1=flight data)	153	154	u	2	1	0		
Data Source 0=unused 1=Fairbanks, AK 2=Wallops Is., VA 3=SOCC 4=Svalbard, Norway 5=Monterey, CA <Zero Fill>	155	156	u	2	1	0		
<Reserved for the Ingester>	157	160	i	4	1	0		
<Reserved for Decommutation>	161	168	c	8	1	0		
<Zero Fill>	169	176	c	8	1	0		
177	186	i	2	5	0			
<b>CALIBRATION</b>								
Auto Calibration Indicators Bit Field bits 15-1: <zero fill> bit 0: auto calibration override switch for HIRS/4 (0=normal calibration sequence enabled during entire time period of this data set; 1=calibration sequence was disabled at some point during time period of this data set)	187	188	u	2	1	0		
Year of Most Recent Solar Channel Calibration (four digits, e.g., 2000)	189	190	u	2	1	0		
Day of Year of Most Recent Solar Channel Calibration (e.g., 365)	191	192	u	2	1	0		
Ch. 1 Mean Calibration Slope	193	196	i	4	1	6		
Ch. 1 Standard Deviation of Calibration Slope	197	200	i	4	1	6		
Ch. 1 B <sub>1</sub>	201	204	i	4	1	6		
Ch. 1 Standard Deviation of Linear Regression for B <sub>1</sub>	205	208	i	4	1	6		
Ch. 17 Mean Calibration Slope	209	212	i	4	1	6		
Ch. 17 Standard Deviation of Calibration Slope	213	216	i	4	1	6		
Ch. 17 B <sub>1</sub>	217	220	i	4	1	6		
Ch. 17 Standard Deviation of Linear Regression for B <sub>1</sub>	221	224	i	4	1	6		
Ch. 2 Mean Calibration Slope	225	228	i	4	1	6		
Ch. 2 Standard Deviation of Calibration Slope	229	232	i	4	1	6		
Ch. 2 B <sub>1</sub>	233	236	i	4	1	6		
Ch. 2 Standard Deviation of Linear Regression for B <sub>1</sub>	237	240	i	4	1	6		
Ch. 3 Mean Calibration Slope	241	244	i	4	1	6		
Ch. 3 Standard Deviation of Calibration Slope	245	248	i	4	1	6		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Ch. 3 B <sub>1</sub>	249	252	i	4	1	6		
Ch. 3 Standard Deviation of Linear Regression for B1	253	256	i	4	1	6		
Ch. 13 Mean Calibration Slope	257	260	i	4	1	6		
Ch. 13 Standard Deviation of Calibration Slope	261	264	i	4	1	6		
Ch. 13 B <sub>1</sub>	265	268	i	4	1	6		
Ch. 13 Standard Deviation of Linear Regression for B1	269	272	i	4	1	6		
Ch. 4 Mean Calibration Slope	273	276	i	4	1	6		
Ch. 4 Standard Deviation of Calibration Slope	277	280	i	4	1	6		
Ch. 4 B <sub>1</sub>	281	284	i	4	1	6		
Ch. 4 Standard Deviation of Linear Regression for B1	285	288	i	4	1	6		
Ch. 18 Mean Calibration Slope	289	292	i	4	1	6		
Ch. 18 Standard Deviation of Calibration Slope	293	296	i	4	1	6		
Ch. 18 B <sub>1</sub>	297	300	i	4	1	6		
Ch. 18 Standard Deviation of Linear Regression for B1	301	304	i	4	1	6		
Ch. 11 Mean Calibration Slope	305	308	i	4	1	6		
Ch. 11 Standard Deviation of Calibration Slope	309	312	i	4	1	6		
Ch. 11 B <sub>1</sub>	313	316	i	4	1	6		
Ch. 11 Standard Deviation of Linear Regression for B1	317	320	i	4	1	6		
Ch. 19 Mean Calibration Slope	321	324	i	4	1	6		
Ch. 19 Standard Deviation of Calibration Slope	325	328	i	4	1	6		
Ch. 19 B <sub>1</sub>	329	332	i	4	1	6		
Ch. 19 Standard Deviation of Linear Regression for B1	333	336	i	4	1	6		
Ch. 7 Mean Calibration Slope	337	340	i	4	1	6		
Ch. 7 Standard Deviation of Calibration Slope	341	344	i	4	1	6		
Ch. 7 B <sub>1</sub>	345	348	i	4	1	6		
Ch. 7 Standard Deviation of Linear Regression for B1	349	352	i	4	1	6		
Ch. 8 Mean Calibration Slope	353	356	i	4	1	6		
Ch. 8 Standard Deviation of Calibration Slope	357	360	i	4	1	6		
Ch. 8 B <sub>1</sub>	361	364	i	4	1	6		
Ch. 8 Standard Deviation of Linear Regression for B1	365	368	i	4	1	6		
Ch. 20 Mean Calibration Slope	369	372	i	4	1	6		
Ch. 20 Standard Deviation of Calibration Slope	373	376	i	4	1	6		
Ch. 20 B <sub>1</sub>	377	380	i	4	1	6		
Ch. 20 Standard Deviation of Linear Regression for B1	381	384	i	4	1	6		
Ch. 10 Mean Calibration Slope	385	388	i	4	1	6		
Ch. 10 Standard Deviation of Calibration Slope	389	392	i	4	1	6		
Ch. 10 B <sub>1</sub>	393	396	i	4	1	6		
Ch. 10 Standard Deviation of Linear Regression for B1	397	400	i	4	1	6		
Ch. 14 Mean Calibration Slope	401	404	i	4	1	6		
Ch. 14 Standard Deviation of Calibration Slope	405	408	i	4	1	6		
Ch. 14 B <sub>1</sub>	409	412	i	4	1	6		
Ch. 14 Standard Deviation of Linear Regression for B1	413	416	i	4	1	6		
Ch. 6 Mean Calibration Slope	417	420	i	4	1	6		
Ch. 6 Standard Deviation of Calibration Slope	421	424	i	4	1	6		
Ch. 6 B <sub>1</sub>	425	428	i	4	1	6		
Ch. 6 Standard Deviation of Linear Regression for B1	429	432	i	4	1	6		
Ch. 5 Mean Calibration Slope	433	436	i	4	1	6		
Ch. 5 Standard Deviation of Calibration Slope	437	440	i	4	1	6		
Ch. 5 B <sub>1</sub>	441	444	i	4	1	6		
Ch. 5 Standard Deviation of Linear Regression for B1	445	448	i	4	1	6		
Ch. 15 Mean Calibration Slope	449	452	i	4	1	6		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
15 Standard Deviation of Calibration Slope	453	456	i	4	1	6		
Ch. 15 B <sub>1</sub>	457	460	i	4	1	6		
Ch. 15 Standard Deviation of Linear Regression for B1	461	464	i	4	1	6		
Ch. 12 Mean Calibration Slope	465	468	i	4	1	6		
Ch. 12 Standard Deviation of Calibration Slope	469	472	i	4	1	6		
Ch. 12 B <sub>1</sub>	473	476	i	4	1	6		
Ch. 12 Standard Deviation of Linear Regression for B1	477	480	i	4	1	6		
Ch. 16 Mean Calibration Slope	481	484	i	4	1	6		
Ch. 16 Standard Deviation of Calibration Slope	485	488	i	4	1	6		
Ch. 16 B <sub>1</sub>	489	492	i	4	1	6		
Ch. 16 Standard Deviation of Linear Regression for B1	493	496	i	4	1	6		
Ch. 9 Mean Calibration Slope	497	500	i	4	1	6		
Ch. 9 Standard Deviation of Calibration Slope	501	504	i	4	1	6		
Ch. 9 B <sub>1</sub>	505	508	i	4	1	6		
Ch. 9 Standard Deviation of Linear Regression for B1	509	512	i	4	1	6		
24-Hour Average Space View Counts	513	592	i	4	20	2counts		
Word 1: Channel 1 Words 2-20: Channels 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9 (in order)								
<Zero Fill>	593	600	i	4	2	0		
<b>TEMPERATURE-RADIANCE CONVERSION</b>								
Temperature-radiance Ch 1 Central Wavenumber	601	604	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 1 Constant 1	605	608	i	4	1	6		
Temperature-radiance Ch 1 Constant 2	609	612	i	4	1	6		
Temperature-radiance Ch 2 Central Wavenumber	613	616	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 2 Constant 1	617	620	i	4	1	6		
Temperature-radiance Ch 2 Constant 2	621	624	i	4	1	6		
Temperature-radiance Ch 3 Central Wavenumber	625	628	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 3 Constant 1	629	632	i	4	1	6		
Temperature-radiance Ch 3 Constant 2	633	636	i	4	1	6		
Temperature-radiance Ch 4 Central Wavenumber	637	640	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 4 Constant 1	641	644	i	4	1	6		
Temperature-radiance Ch 4 Constant 2	645	648	i	4	1	6		
Temperature-radiance Ch 5 Central Wavenumber	649	652	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 5 Constant 1	653	656	i	4	1	6		
Temperature-radiance Ch 5 Constant 2	657	660	i	4	1	6		
Temperature-radiance Ch 6 Central Wavenumber	661	664	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 6 Constant 1	665	668	i	4	1	6		
Temperature-radiance Ch 6 Constant 2	669	672	i	4	1	6		
Temperature-radiance Ch 7 Central Wavenumber	673	676	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 7 Constant 1	677	680	i	4	1	6		
Temperature-radiance Ch 7 Constant 2	681	684	i	4	1	6		
Temperature-radiance Ch 8 Central Wavenumber	685	688	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 8 Constant 1	689	692	i	4	1	6		
Temperature-radiance Ch 8 Constant 2	693	696	i	4	1	6		
Temperature-radiance Ch 9 Central Wavenumber	697	700	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 9 Constant 1	701	704	i	4	1	6		
Temperature-radiance Ch 9 Constant 2	705	708	i	4	1	6		
Temperature-radiance Ch 10 Central Wavenumber	709	712	i	4	1	6cm <sup>-1</sup>		
Temperature-radiance Ch 10 Constant 1	713	716	i	4	1	6		
Temperature-radiance Ch 10 Constant 2	717	720	i	4	1	6		
Temperature-radiance Ch 11 Central Wavenumber	721	724	i	4	1	6cm <sup>-1</sup>		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Temperature-radiance Ch 11 Constant 1	725	728	i	4	1	6		
Temperature-radiance Ch 11 Constant 2	729	732	i	4	1	6		
Temperature-radiance Ch 12 Central Wavenumber	733	736	i	4	1	6	cm <sup>-1</sup>	
Temperature-radiance Ch 12 Constant 1	737	740	i	4	1	6		
Temperature-radiance Ch 12 Constant 2	741	744	i	4	1	6		
Temperature-radiance Ch 13 Central Wavenumber	745	748	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 13 Constant 1	749	752	i	4	1	6		
Temperature-radiance Ch 13 Constant 2	753	756	i	4	1	6		
Temperature-radiance Ch 14 Central Wavenumber	757	760	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 14 Constant 1	761	764	i	4	1	6		
Temperature-radiance Ch 14 Constant 2	765	768	i	4	1	6		
Temperature-radiance Ch 15 Central Wavenumber	769	772	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 15 Constant 1	773	776	i	4	1	6		
Temperature-radiance Ch 15 Constant 2	777	780	i	4	1	6		
Temperature-radiance Ch 16 Central Wavenumber	781	784	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 16 Constant 1	785	788	i	4	1	6		
Temperature-radiance Ch 16 Constant 2	789	792	i	4	1	6		
Temperature-radiance Ch 17 Central Wavenumber	793	796	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 17 Constant 1	797	800	i	4	1	6		
Temperature-radiance Ch 17 Constant 2	801	804	i	4	1	6		
Temperature-radiance Ch 18 Central Wavenumber	805	808	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 18 Constant 1	809	812	i	4	1	6		
Temperature-radiance Ch 18 Constant 2	813	816	i	4	1	6		
Temperature-radiance Ch 19 Central Wavenumber	817	820	i	4	1	5	cm <sup>-1</sup>	
Temperature-radiance Ch 19 Constant 1	821	824	i	4	1	6		
Temperature-radiance Ch 19 Constant 2	825	828	i	4	1	6		
Albedo-radiance Ch 20 Solar Filtered Irradiance	829	830	i	2	1	6		
Albedo-radiance Ch 20 Equivalent Filter Width	831	832	i	2	1	6		
<Zero Fill>	833	840	i	4	2	0		
<b>NAVIGATION</b>								
Reference Ellipsoid Model ID ( <i>The ellipsoid is a mathematically tractable approximation of the geoid, which is an equipotential surface at mean sea level. The maximum departure of the ellipsoid from the geoid is approximately +/- 65 meters.</i> )	841	848	c	8	1	0		
WGS-72=World Geodetic Survey 1972								
Nadir Earth Location Tolerance	849	850	u	2	1	1	kilometers	
Earth Location Bit Field bits 15-2: <zero fill> bit 1: reasonableness test (0=inactive; 1=active) bit 0: attitude error correction (0=not corrected; 1=corrected)	851	852	u	2	1	0		
<Zero Fill>	853	854	i	2	1	0		
Constant Roll Attitude Error	855	856	i	2	1	3	degrees	
Constant Pitch Attitude Error	857	858	i	2	1	3	degrees	
Constant Yaw Attitude Error	859	860	i	2	1	3	degrees	
Epoch Year for Orbit Vector	861	862	u	2	1	0		
Day of Epoch Year for Orbit Vector	863	864	u	2	1	0		
Epoch UTC Time of Day for Orbit Vector	865	868	u	4	1	0	milliseconds	
Semi-major Axis ( <i>at the orbit vector epoch time</i> )	869	872	i	4	1	5	kilometers	
Eccentricity ( <i>at the orbit vector epoch time</i> )	873	876	i	4	1	8		
Inclination ( <i>at the orbit vector epoch time</i> )	877	880	i	4	1	5	degrees	
Argument of Perigee ( <i>at the orbit vector epoch time</i> )	881	884	i	4	1	5	degrees	

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Right Ascension of the Ascending Node (at the orbit vector epoch time)	885	888	i	4	1	5	degrees	
Mean Anomaly (at the orbit vector epoch time)	889	892	i	4	1	5	degrees	
Position Vector X Component (at the orbit vector epoch time)	893	896	i	4	1	5	kilometers	
Position Vector Y Component (at the orbit vector epoch time)	897	900	i	4	1	5	kilometers	
Position Vector Z Component (at the orbit vector epoch time)	901	904	i	4	1	5	kilometers	
Velocity Vector X-dot Component (at the orbit vector epoch time)	905	908	i	4	1	8	km/second	
Velocity Vector Y-dot Component (at the orbit vector epoch time)	909	912	i	4	1	8	km/second	
Velocity Vector Z-dot Component (at the orbit vector epoch time)	913	916	i	4	1	8	km/second	
Earth/Sun Distance Ratio (at the orbit vector epoch time; relative to the mean distance of 1 AU)	917	920	u	4	1	6		
<Zero Fill>	921	936	i	4	4	0		
<b>ANALOG TELEMETRY CONVERSION</b>								
Volts-to-engineering units (e.g., temperature in Celsius) conversion coefficients for the analog telemetry items. (NOTE: 1 count = 0.02 volts.)								
Radiator Temperature Coefficient 1	937	940	i	4	1	2	C	
Radiator Temperature Coefficient 2	941	944	i	4	1	2	C/volt	
Radiator Temperature Coefficient 3	945	948	i	4	1	3	C/volt <sup>2</sup>	
Radiator Temperature Coefficient 4	949	952	i	4	1	3	C/volt <sup>3</sup>	
Radiator Temperature Coefficient 5	953	956	i	4	1	3	C/volt <sup>4</sup>	
Radiator Temperature Coefficient 6	957	960	i	4	1	5	C/volt <sup>5</sup>	
Base Plate Temperature Coefficient 1	961	964	i	4	1	2	C	
Base Plate Temperature Coefficient 2	965	968	i	4	1	2	C/volt	
Base Plate Temperature Coefficient 3	969	972	i	4	1	3	C/volt <sup>2</sup>	
Base Plate Temperature Coefficient 4	973	976	i	4	1	3	C/volt <sup>3</sup>	
Base Plate Temperature Coefficient 5	977	980	i	4	1	3	C/volt <sup>4</sup>	
Base Plate Temperature Coefficient 6	981	984	i	4	1	5	C/volt <sup>5</sup>	
Electronics Temperature Coefficient 1	985	988	i	4	1	2	C	
Electronics Temperature Coefficient 2	989	992	i	4	1	2	C/volt	
Electronics Temperature Coefficient 3	993	996	i	4	1	3	C/volt <sup>2</sup>	
Electronics Temperature Coefficient 4	997	1000	i	4	1	3	C/volt <sup>3</sup>	
Electronics Temperature Coefficient 5	1001	1004	i	4	1	3	C/volt <sup>4</sup>	
Electronics Temperature Coefficient 6	1005	1008	i	4	1	5	C/volt <sup>5</sup>	
Patch Temperature Coefficient 1	1009	1012	i	4	1	2	C	
Patch Temperature Coefficient 2	1013	1016	i	4	1	2	C/volt	
Patch Temperature Coefficient 3	1017	1020	i	4	1	3	C/volt <sup>2</sup>	
Patch Temperature Coefficient 4	1021	1024	i	4	1	3	C/volt <sup>3</sup>	
Patch Temperature Coefficient 5	1025	1028	i	4	1	3	C/volt <sup>4</sup>	
Patch Temperature Coefficient 6	1029	1032	i	4	1	5	C/volt <sup>5</sup>	
Filter Housing Controller Current Coefficient 1	1033	1036	i	4	1	2	amps	
Filter Housing Controller Current Coefficient 2	1037	1040	i	4	1	2	amps/volt	
Filter Housing Controller Current Coefficient 3	1041	1044	i	4	1	3	amps/volt <sup>2</sup>	
Filter Housing Controller Current Coefficient 4	1045	1048	i	4	1	3	amps/volt <sup>3</sup>	
Filter Housing Controller Current Coefficient 5	1049	1052	i	4	1	3	amps/volt <sup>4</sup>	
Filter Housing Controller Current Coefficient 6	1053	1056	i	4	1	5	amps/volt <sup>5</sup>	
Scan Motor Temperature Coefficient 1	1057	1060	i	4	1	2	C	
Scan Motor Temperature Coefficient 2	1061	1064	i	4	1	2	C/volt	
Scan Motor Temperature Coefficient 3	1065	1068	i	4	1	3	C/volt <sup>2</sup>	

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Scan Motor Temperature Coefficient 4	1069	1072	i	4	1	3	C/volt <sup>3</sup>	
Scan Motor Temperature Coefficient 5	1073	1076	i	4	1	3	C/volt <sup>4</sup>	
Scan Motor Temperature Coefficient 6	1077	1080	i	4	1	5	C/volt <sup>5</sup>	
Filter Wheel Motor Temperature Coefficient 1	1081	1084	i	4	1	2	C	
Filter Wheel Motor Temperature Coefficient 2	1085	1088	i	4	1	2	C/volt	
Filter Wheel Motor Temperature Coefficient 3	1089	1092	i	4	1	3	C/volt <sup>2</sup>	
Filter Wheel Motor Temperature Coefficient 4	1093	1096	i	4	1	3	C/volt <sup>3</sup>	
Filter Wheel Motor Temperature Coefficient 5	1097	1100	i	4	1	3	C/volt <sup>4</sup>	
Filter Wheel Motor Temperature Coefficient 6	1101	1104	i	4	1	5	C/volt <sup>5</sup>	
+5 VDC Monitor Coefficient 1	1105	1108	i	4	1	2		
+5 VDC Monitor Coefficient 2	1109	1112	i	4	1	2		
+5 VDC Monitor Coefficient 3	1113	1116	i	4	1	3		
+5 VDC Monitor Coefficient 4	1117	1120	i	4	1	3		
+5 VDC Monitor Coefficient 5	1121	1124	i	4	1	3		
+5 VDC Monitor Coefficient 6	1125	1128	i	4	1	5		
+10 VDC TLM/DC/DC Coefficient 1	1129	1132	i	4	1	2		
+10 VDC TLM/DC/DC Coefficient 2	1133	1136	i	4	1	2		
+10 VDC TLM/DC/DC Coefficient 3	1137	1140	i	4	1	3		
+10 VDC TLM/DC/DC Coefficient 4	1141	1144	i	4	1	3		
+10 VDC TLM/DC/DC Coefficient 5	1145	1148	i	4	1	3		
+10 VDC TLM/DC/DC Coefficient 6	1149	1152	i	4	1	5		
+7.5 VDC TLM/DC/DC Coefficient 1	1153	1156	i	4	1	2		
+7.5 VDC TLM/DC/DC Coefficient 2	1157	1160	i	4	1	2		
+7.5 VDC TLM/DC/DC Coefficient 3	1161	1164	i	4	1	3		
+7.5 VDC TLM/DC/DC Coefficient 4	1165	1168	i	4	1	3		
+7.5 VDC TLM/DC/DC Coefficient 5	1169	1172	i	4	1	3		
+7.5 VDC TLM/DC/DC Coefficient 6	1173	1176	i	4	1	5		
-7.5 VDC TLM/DC/DC Coefficient 1	1177	1180	i	4	1	2		
-7.5 VDC TLM/DC/DC Coefficient 2	1181	1184	i	4	1	2		
-7.5 VDC TLM/DC/DC Coefficient 3	1185	1188	i	4	1	3		
-7.5 VDC TLM/DC/DC Coefficient 4	1189	1192	i	4	1	3		
-7.5 VDC TLM/DC/DC Coefficient 5	1193	1196	i	4	1	3		
-7.5 VDC TLM/DC/DC Coefficient 6	1197	1200	i	4	1	5		
+15 VDC Monitor Coefficient 1	1201	1204	i	4	1	2		
+15 VDC Monitor Coefficient 2	1205	1208	i	4	1	2		
+15 VDC Monitor Coefficient 3	1209	1212	i	4	1	3		
+15 VDC Monitor Coefficient 4	1213	1216	i	4	1	3		
+15 VDC Monitor Coefficient 5	1217	1220	i	4	1	3		
+15 VDC Monitor Coefficient 6	1221	1224	i	4	1	5		
-15 VDC Monitor Coefficient 1	1225	1228	i	4	1	2		
-15 VDC Monitor Coefficient 2	1229	1232	i	4	1	2		
-15 VDC Monitor Coefficient 3	1233	1236	i	4	1	3		
-15 VDC Monitor Coefficient 4	1237	1240	i	4	1	3		
-15 VDC Monitor Coefficient 5	1241	1244	i	4	1	3		
-15 VDC Monitor Coefficient 6	1245	1248	i	4	1	5		
Filter Wheel Motor Current Coefficient 1	1249	1252	i	4	1	2	amps	
Filter Wheel Motor Current Coefficient 2	1253	1256	i	4	1	2	amps/volt	
Filter Wheel Motor Current Coefficient 3	1257	1260	i	4	1	3	amps/volt <sup>2</sup>	
Filter Wheel Motor Current Coefficient 4	1261	1264	i	4	1	3	amps/volt <sup>3</sup>	
Filter Wheel Motor Current Coefficient 5	1265	1268	i	4	1	3	amps/volt <sup>4</sup>	
Filter Wheel Motor Current Coefficient 6	1269	1272	i	4	1	5	amps/volt <sup>5</sup>	

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Scan Motor Current Coefficient 1	1273	1276	i	4	1	2	amps	
Scan Motor Current Coefficient 2	1277	1280	i	4	1	2	amps/volt	
Scan Motor Current Coefficient 3	1281	1284	i	4	1	3	amps/volt <sup>2</sup>	
Scan Motor Current Coefficient 4	1285	1288	i	4	1	3	amps/volt <sup>3</sup>	
Scan Motor Current Coefficient 5	1289	1292	i	4	1	3	amps/volt <sup>4</sup>	
Scan Motor Current Coefficient 6	1293	1296	i	4	1	5	amps/volt <sup>5</sup>	
Patch Controller Power Coefficient 1	1297	1300	i	4	1	2	watts	
Patch Controller Power Coefficient 2	1301	1304	i	4	1	2	watts/volt	
Patch Controller Power Coefficient 3	1305	1308	i	4	1	3	watts/volt <sup>2</sup>	
Patch Controller Power Coefficient 4	1309	1312	i	4	1	3	watts/volt <sup>3</sup>	
Patch Controller Power Coefficient 5	1313	1316	i	4	1	3	watts/volt <sup>4</sup>	
Patch Controller Power Coefficient 6	1317	1320	i	4	1	5	watts/volt <sup>5</sup>	
<b>DIGITAL A TELEMETRY CONVERSION</b>								
Internal Warm Target, Temperature Sensor #1, Coefficient 1	1321	1324	i	4	1	6	C	
Internal Warm Target, Temperature Sensor #1, Coefficient 2	1325	1328	i	4	1	9	C/count	
Internal Warm Target, Temperature Sensor #1, Coefficient 3	1329	1332	i	4	1	14	C/count <sup>2</sup>	
Internal Warm Target, Temperature Sensor #1, Coefficient 4	1333	1336	i	4	1	17	C/count <sup>3</sup>	
Internal Warm Target, Temperature Sensor #1, Coefficient 5	1337	1340	i	4	1	21	C/count <sup>4</sup>	
Internal Warm Target, Temperature Sensor #1, Coefficient 6	1341	1344	i	4	1	25	C/count <sup>5</sup>	
Internal Warm Target, Temperature Sensor #2, Coefficient 1	1345	1348	i	4	1	6	C	
Internal Warm Target, Temperature Sensor #2, Coefficient 2	1349	1352	i	4	1	9	C/count	
Internal Warm Target, Temperature Sensor #2, Coefficient 3	1353	1356	i	4	1	14	C/count <sup>2</sup>	
Internal Warm Target, Temperature Sensor #2, Coefficient 4	1357	1360	i	4	1	17	C/count <sup>3</sup>	
Internal Warm Target, Temperature Sensor #2, Coefficient 5	1361	1364	i	4	1	21	C/count <sup>4</sup>	
Internal Warm Target, Temperature Sensor #2, Coefficient 6	1365	1368	i	4	1	25	C/count <sup>5</sup>	
Internal Warm Target, Temperature Sensor #3, Coefficient 1	1369	1372	i	4	1	6	C	
Internal Warm Target, Temperature Sensor #3, Coefficient 2	1373	1376	i	4	1	9	C/count	
Internal Warm Target, Temperature Sensor #3, Coefficient 3	1377	1380	i	4	1	14	C/count <sup>2</sup>	
Internal Warm Target, Temperature Sensor #3, Coefficient 4	1381	1384	i	4	1	17	C/count <sup>3</sup>	
Internal Warm Target, Temperature Sensor #3, Coefficient 5	1385	1388	i	4	1	21	C/count <sup>4</sup>	
Internal Warm Target, Temperature Sensor #3, Coefficient 6	1389	1392	i	4	1	25	C/count <sup>5</sup>	
Internal Warm Target, Temperature Sensor #4, Coefficient 1	1393	1396	i	4	1	6	C	
Internal Warm Target, Temperature Sensor #4, Coefficient 2	1397	1400	i	4	1	9	C/count	
Internal Warm Target, Temperature Sensor #4, Coefficient 3	1401	1404	i	4	1	14	C/count <sup>2</sup>	
Internal Warm Target, Temperature Sensor #4, Coefficient 4	1405	1408	i	4	1	17	C/count <sup>3</sup>	
Internal Warm Target, Temperature Sensor #4, Coefficient 5	1409	1412	i	4	1	21	C/count <sup>4</sup>	
Internal Warm Target, Temperature Sensor #4, Coefficient 6	1413	1416	i	4	1	25	C/count <sup>5</sup>	
Internal Warm Target, Temperature Sensor #5, Coefficient 1	1417	1420	i	4	1	6	C	
Internal Warm Target, Temperature Sensor #5, Coefficient 2	1421	1424	i	4	1	9	C/count	
Internal Warm Target, Temperature Sensor #5, Coefficient 3	1425	1428	i	4	1	14	C/count <sup>2</sup>	
Internal Warm Target, Temperature Sensor #5, Coefficient 4	1429	1432	i	4	1	17	C/count <sup>3</sup>	
Internal Warm Target, Temperature Sensor #5, Coefficient 5	1433	1436	i	4	1	21	C/count <sup>4</sup>	
Internal Warm Target, Temperature Sensor #5, Coefficient 6	1437	1440	i	4	1	25	C/count <sup>5</sup>	
Internal Cold Target, Temperature Sensor #1, Coefficient 1	1441	1444	i	4	1	6	C	
Internal Cold Target, Temperature Sensor #1, Coefficient 2	1445	1448	i	4	1	9	C/count	
Internal Cold Target, Temperature Sensor #1, Coefficient 3	1449	1452	i	4	1	14	C/count <sup>2</sup>	
Internal Cold Target, Temperature Sensor #1, Coefficient 4	1453	1456	i	4	1	17	C/count <sup>3</sup>	
Internal Cold Target, Temperature Sensor #1, Coefficient 5	1457	1460	i	4	1	21	C/count <sup>4</sup>	
Internal Cold Target, Temperature Sensor #1, Coefficient 6	1461	1464	i	4	1	25	C/count <sup>5</sup>	
Tertiary Telescope Temperature Sensor Coefficient 1	1465	1468	i	4	1	6	C	
Tertiary Telescope Temperature Sensor Coefficient 2	1469	1472	i	4	1	9	C/count	

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Tertiary Telescope Temperature Sensor Coefficient 3	1473	1476	i	4	1	14	C/count <sup>2</sup>	
Tertiary Telescope Temperature Sensor Coefficient 4	1477	1480	i	4	1	17	C/count <sup>3</sup>	
Tertiary Telescope Temperature Sensor Coefficient 5	1481	1484	i	4	1	21	C/count <sup>4</sup>	
Tertiary Telescope Temperature Sensor Coefficient 6	1485	1488	i	4	1	25	C/count <sup>5</sup>	
Filter Wheel Housing, Temperature Sensor #1, Coefficient 1	1489	1492	i	4	1	6	C	
Filter Wheel Housing, Temperature Sensor #1, Coefficient 2	1493	1496	i	4	1	9	C/count	
Filter Wheel Housing, Temperature Sensor #1, Coefficient 3	1497	1500	i	4	1	14	C/count <sup>2</sup>	
Filter Wheel Housing, Temperature Sensor #1, Coefficient 4	1501	1504	i	4	1	17	C/count <sup>3</sup>	
Filter Wheel Housing, Temperature Sensor #1, Coefficient 5	1505	1508	i	4	1	21	C/count <sup>4</sup>	
Filter Wheel Housing, Temperature Sensor #1, Coefficient 6	1509	1512	i	4	1	25	C/count <sup>5</sup>	
Filter Wheel Housing, Temperature Sensor #2, Coefficient 1	1513	1516	i	4	1	6	C	
Filter Wheel Housing, Temperature Sensor #2, Coefficient 2	1517	1520	i	4	1	9	C/count	
Filter Wheel Housing, Temperature Sensor #2, Coefficient 3	1521	1524	i	4	1	14	C/count <sup>2</sup>	
Filter Wheel Housing, Temperature Sensor #2, Coefficient 4	1525	1528	i	4	1	17	C/count <sup>3</sup>	
Filter Wheel Housing, Temperature Sensor #2, Coefficient 5	1529	1532	i	4	1	21	C/count <sup>4</sup>	
Filter Wheel Housing, Temperature Sensor #2, Coefficient 6	1533	1536	i	4	1	25	C/count <sup>5</sup>	
Filter Wheel Housing, Temperature Sensor #3, Coefficient 1	1537	1540	i	4	1	6	C	
Filter Wheel Housing, Temperature Sensor #3, Coefficient 2	1541	1544	i	4	1	9	C/count	
Filter Wheel Housing, Temperature Sensor #3, Coefficient 3	1545	1548	i	4	1	14	C/count <sup>2</sup>	
Filter Wheel Housing, Temperature Sensor #3, Coefficient 4	1549	1552	i	4	1	17	C/count <sup>3</sup>	
Filter Wheel Housing, Temperature Sensor #3, Coefficient 5	1553	1556	i	4	1	21	C/count <sup>4</sup>	
Filter Wheel Housing, Temperature Sensor #3, Coefficient 6	1557	1560	i	4	1	25	C/count <sup>5</sup>	
Filter Wheel Housing, Temperature Sensor #4, Coefficient 1	1561	1564	i	4	1	6	C	
Filter Wheel Housing, Temperature Sensor #4, Coefficient 2	1565	1568	i	4	1	9	C/count	
Filter Wheel Housing, Temperature Sensor #4, Coefficient 3	1569	1572	i	4	1	14	C/count <sup>2</sup>	
Filter Wheel Housing, Temperature Sensor #4, Coefficient 4	1573	1576	i	4	1	17	C/count <sup>3</sup>	
Filter Wheel Housing, Temperature Sensor #4, Coefficient 5	1577	1580	i	4	1	21	C/count <sup>4</sup>	
Filter Wheel Housing, Temperature Sensor #4, Coefficient 6	1581	1584	i	4	1	25	C/count <sup>5</sup>	
Patch Temperature (Expanded Scale) Coefficient 1	1585	1588	i	4	1	6	C	
Patch Temperature (Expanded Scale) Coeficient 2	1589	1592	i	4	1	9	C/count	
Patch Temperature (Expanded Scale) Coefficient 3	1593	1596	i	4	1	14	C/count <sup>2</sup>	
Patch Temperature (Expanded Scale) Coeficient 4	1597	1600	i	4	1	17	C/count <sup>3</sup>	
Patch Temperature (Expanded Scale) Coeficient 5	1601	1604	i	4	1	21	C/count <sup>4</sup>	
Patch Temperature (Expanded Scale) Coeficient 6	1605	1608	i	4	1	25	C/count <sup>5</sup>	
First Stage Radiator Temperature Sensor Coefficient 1	1609	1612	i	4	1	6	C	
First Stage Radiator Temperature Sensor Coefficient 2	1613	1616	i	4	1	9	C/count	
First Stage Radiator Temperature Sensor Coefficient 3	1617	1620	i	4	1	14	C/count <sup>2</sup>	
First Stage Radiator Temperature Sensor Coefficient 4	1621	1624	i	4	1	17	C/count <sup>3</sup>	
First Stage Radiator Temperature Sensor Coefficient 5	1625	1628	i	4	1	21	C/count <sup>4</sup>	
First Stage Radiator Temperature Sensor Coefficient 6	1629	1632	i	4	1	25	C/count <sup>5</sup>	
Scan Mirror Temperature Coefficient 1	1633	1636	i	4	1	6	C	
Scan Mirror Temperature Coefficient 2	1637	1640	i	4	1	9	C/count	
Scan Mirror Temperature Coefficient 3	1641	1644	i	4	1	14	C/count <sup>2</sup>	
Scan Mirror Temperature Coefficient 4	1645	1648	i	4	1	17	C/count <sup>3</sup>	
Scan Mirror Temperature Coefficient 5	1649	1652	i	4	1	21	C/count <sup>4</sup>	
Scan Mirror Temperature Coefficient 6	1653	1656	i	4	1	25	C/count <sup>5</sup>	
Primary Telescope Temperature Coefficient 1	1657	1660	i	4	1	6	C	
Primary Telescope Temperature Coefficient 2	1661	1664	i	4	1	9	C/count	
Primary Telescope Temperature Coefficient 3	1665	1668	i	4	1	14	C/count <sup>2</sup>	
Primary Telescope Temperature Coefficient 4	1669	1672	i	4	1	17	C/count <sup>3</sup>	
Primary Telescope Temperature Coefficient 5	1673	1676	i	4	1	21	C/count <sup>4</sup>	

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Secondary Telescope Temperature Coefficient 6	1677	1680	i	4	1	25	C/count <sup>5</sup>	
Secondary Telescope Temperature Coefficient 1	1681	1684	i	4	1	6	C	
Secondary Telescope Temperature Coefficient 2	1685	1688	i	4	1	9	C/count	
Secondary Telescope Temperature Coefficient 3	1689	1692	i	4	1	14	C/count <sup>2</sup>	
Secondary Telescope Temperature Coefficient 4	1693	1696	i	4	1	17	C/count <sup>3</sup>	
Secondary Telescope Temperature Coefficient 5	1697	1700	i	4	1	21	C/count <sup>4</sup>	
Secondary Telescope Temperature Coefficient 6	1701	1704	i	4	1	25	C/count <sup>5</sup>	
Baseplate Temperature Coefficient 1	1705	1708	i	4	1	6	C	
Baseplate Temperature Coefficient 2	1709	1712	i	4	1	9	C/count	
Baseplate Temperature Coefficient 3	1713	1716	i	4	1	14	C/count <sup>2</sup>	
Baseplate Temperature Coefficient 4	1717	1720	i	4	1	17	C/count <sup>3</sup>	
Baseplate Temperature Coefficient 5	1721	1724	i	4	1	21	C/count <sup>4</sup>	
Baseplate Temperature Coefficient 6	1725	1728	i	4	1	25	C/count <sup>5</sup>	
Electronics Temperature Coefficient 1	1729	1732	i	4	1	6	C	
Electronics Temperature Coefficient 2	1733	1736	i	4	1	9	C/count	
Electronics Temperature Coefficient 3	1737	1740	i	4	1	14	C/count <sup>2</sup>	
Electronics Temperature Coefficient 4	1741	1744	i	4	1	17	C/count <sup>3</sup>	
Electronics Temperature Coefficient 5	1745	1748	i	4	1	21	C/count <sup>4</sup>	
Electronics Temperature Coefficient 6	1749	1752	i	4	1	25	C/count <sup>5</sup>	
Patch Temperature Full Range Coefficient 1	1753	1756	i	4	1	6	C	
Patch Temperature Full Range Coefficient 2	1757	1760	i	4	1	9	C/count	
Patch Temperature Full Range Coefficient 3	1761	1764	i	4	1	14	C/count <sup>2</sup>	
Patch Temperature Full Range Coefficient 4	1765	1768	i	4	1	17	C/count <sup>3</sup>	
Patch Temperature Full Range Coefficient 5	1769	1772	i	4	1	21	C/count <sup>4</sup>	
Patch Temperature Full Range Coefficient 6	1773	1776	i	4	1	25	C/count <sup>5</sup>	
Scan Motor Temperature Coefficient 1	1777	1780	i	4	1	6	C	
Scan Motor Temperature Coefficient 2	1781	1784	i	4	1	9	C/count	
Scan Motor Temperature Coefficient 3	1785	1788	i	4	1	14	C/count <sup>2</sup>	
Scan Motor Temperature Coefficient 4	1789	1792	i	4	1	17	C/count <sup>3</sup>	
Scan Motor Temperature Coefficient 5	1793	1796	i	4	1	21	C/count <sup>4</sup>	
Scan Motor Temperature Coefficient 6	1797	1800	i	4	1	25	C/count <sup>5</sup>	
Filter Wheel Motor Temperature Coefficient 1	1801	1804	i	4	1	6	C	
Filter Wheel Motor Temperature Coefficient 2	1805	1808	i	4	1	9	C/count	
Filter Wheel Motor Temperature Coefficient 3	1809	1812	i	4	1	14	C/count <sup>2</sup>	
Filter Wheel Motor Temperature Coefficient 4	1813	1816	i	4	1	17	C/count <sup>3</sup>	
Filter Wheel Motor Temperature Coefficient 5	1817	1820	i	4	1	21	C/count <sup>4</sup>	
Filter Wheel Motor Temperature Coefficient 6	1821	1824	i	4	1	25	C/count <sup>5</sup>	
Cooler Housing Temperature Coefficient 1	1825	1828	i	4	1	6	C	
Cooler Housing Temperature Coefficient 2	1829	1832	i	4	1	9	C/count	
Cooler Housing Temperature Coefficient 3	1833	1836	i	4	1	14	C/count <sup>2</sup>	
Cooler Housing Temperature Coefficient 4	1837	1840	i	4	1	17	C/count <sup>3</sup>	
Cooler Housing Temperature Coefficient 5	1841	1844	i	4	1	21	C/count <sup>4</sup>	
Cooler Housing Temperature Coefficient 6	1845	1848	i	4	1	25	C/count <sup>5</sup>	
Filter Wheel Housing Heater Current Conversion Constant	1849	1852	i	4	1	9	amps/count	
Electronic Calibration Digital to Analog Converter Conversion Constant	1853	1856	i	4	1	1		
Patch Control Power Conversion Constant	1857	1860	i	4	1	17	watts/count <sup>2</sup>	
Scan Motor Current Conversion Constant	1861	1864	i	4	1	9	amps/count	
Filter Motor Current Conversion Constant	1865	1868	i	4	1	9	amps/count	
+15 VDC Conversion Constant	1869	1872	i	4	1	8	volts/count	
-15 VDC Conversion Constant	1873	1876	i	4	1	8	volts/count	

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Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
+7.5 VDC Conversion Constant	1877	1880	i	4	1	8	volts/count	
-7.5 VDC Conversion Constant	1881	1884	i	4	1	8	volts/count	
+10 VDC Conversion Constant	1885	1888	i	4	1	8	volts/count	
+5 VDC Conversion Constant	1889	1892	i	4	1	8	volts/count	
<b>FILLER</b>								
<Zero Fill>	1893	4608	i	2	1358	0		

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## 4.2 HIRS 1b Data Record Format

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<b>SCAN LINE INFORMATION</b>								
Scan Line Number ( <i>cumulative, starting with 1</i> )	1	2	u	2	1	0		
Scan Line Year ( <i>four digits, e.g., 2000</i> )	3	4	u	2	1	0		
Scan Line Day of Year ( <i>e.g., 365</i> )	5	6	u	2	1	0		
Satellite Clock Drift Delta	7	8	i	2	1	0	milliseconds	
Scan Line UTC Time of Day	9	12	u	4	1	0	milliseconds	
Scan Line Bit Field bit 15: satellite direction (0=northbound; 1=southbound) bit 14: clock drift correction (0=not corrected; 1=scan time corrected for clock drift) bits 13-0: <zero fill>	13	14	u	2	1	0		
Major Frame Count ( <i>cumulative, starting with 1</i> ) ( <i>NOAA</i> ) or <Zero Fill> ( <i>Metop</i> )	15	16	u	2	1	0		
Scan Position Number in 32 Second Cycle ( <i>NOAA</i> ) or <Zero Fill> ( <i>Metop</i> )	17	18	u	2	1	0		
Scan Type Code 0=earth view 1=space view 2=cold blackbody (BB) view 3=main (warm) BB view <Zero Fill>	19	20	u	2	1	0		
<b>QUALITY INDICATORS</b>								
Quality Indicator Bit Field ( <i>If a bit is on (=1), the statement is true.</i> ) bit 31: do not use scan for product generation bit 30: time sequence error detected within this scan (see below) bit 29: data gap precedes this scan bit 28: insufficient data for calibration (see below) bit 27: earth location data not available (see below) bit 26: first good time following a clock update (nominally 0) bit 25: instrument status changed with this scan bits 24 - 0: <zero fill>	29	32	u	4	1	0		
Scan Line Quality Flags [<Reserved>] ( <i>zero fill</i> )	33	33	u	1	1	0		
Scan Line Quality Flags [Time Problem Code] ( <i>If a bit is on (=1), the statement is true. All bits off implies the scan time is as expected.</i> ) bit 7: time field is bad but can probably be inferred from the previous good time bit 6: time field is bad and can't be inferred from the previous good time bit 5: this record starts a sequence that is inconsistent with previous times (i.e., there is a time discontinuity). This may be associated with a spacecraft clock update. (See bit 26, Quality Indicator Bit Field.) bit 4: start of a sequence that apparently repeats scan times that have been previously accepted bits 3-0: <zero fill>	34	34	u	1	1	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Scan Line Quality Flags [Calibration Problem Code] ( <i>If a bit is on (=1), the statement is true. These bits complement the channel indicators; all bits set to 0 indicates normal calibration.</i> ) bit 7: scan line was not calibrated because of bad time bit 6: scan line was calibrated using fewer than the preferred number of scan lines because of proximity to start or end of data set or to a data gap bit 5: scan line was not calibrated because of bad or insufficient PRT data bit 4: scan line was calibrated but with marginal PRT data bit 3: some uncalibrated channels on this scan (see channel indicators) bit 2: uncalibrated due to instrument mode bit 1: moonlight detected in space views; using daily orbital average space counts for calibration bit 0: scan line was not calibrated because of satellite maneuver (Metop) or <zero fill> (NOAA)	35	35	u	1	1	0		
Scan Line Quality Flags [Earth Location Problem Code] ( <i>If a bit is on (=1), the statement is true. All bits set to 0 implies the earth location was normal.</i> ) bit 7: not earth located because of bad time; earth location fields zero-filled bit 6: earth location questionable: questionable time code (see time problem flags above) bit 5: earth location questionable: marginal agreement with reasonableness check bit 4: earth location questionable: fails reasonableness check bits 3-2: <zero fill> bit 1: not earth located because of satellite in-plane maneuver (Metop) or <zero fill> (NOAA) bit 0: not earth located because of satellite out-of-plane maneuver (Metop) or <zero fill> (NOAA)	36	36	u	1	1	0		
Calibration Quality Flags ( <i>all bits off implies a good calibration</i> ) <i>Word 1: Channel 1</i> bit 15-6: <zero fill> bit 5: all bad blackbody counts for scan line bit 4: all bad space view counts for scan line bit 3: all bad PRTs for this line bit 2: marginal blackbody view counts for this line bit 1: marginal space view counts for this line bit 0: marginal PRT temperatures on this line  <i>Words 2-20: Channels 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9 (in order)</i>	37	76	u	2	20	0		
Minor Frame Quality Indicator Bit Fields ( <i>for bits 7 through 1, if bit is on (=1) then statement is true</i> ) <i>Word 1: Minor Frame 0</i> bit 7: this frame suspect due to a time error (NOAA) or <zero fill> (Metop) bit 6: this frame contains data gap data fill (NOAA) or <zero fill> (Metop) bit 5: this frame contains TIP dwell data fill (NOAA) or <zero fill> (Metop) bit 4: data suspect due to PACS QC error (NOAA) or <zero fill> (Metop) bit 3: mirror locked during this frame (NOAA) or <zero fill> (Metop) bit 2: mirror position error during this frame (NOAA) or <zero fill> (Metop) bit 1: mirror was moving during this frame (NOAA) or <zero fill> (Metop) bit 0: minor word odd parity bit  <i>Words 2 - 64: Minor Frames 1 - 63 (in order)</i>	77	140	u	1	64	0		
<Zero Fill>	141	156	i	4	4	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<b>CALIBRATION COEFFICIENTS</b>								
<i>Note: The following coefficients are &lt;Zero Fill&gt; in commanded position modes (nadir, space, internal cold target, internal warm target). Refer to Data Element 63, First and Second Status Words for the current mode.</i>								
Primary Calibration Ch 1 Second Order Term	157	160	i	4	1	12		
Primary Calibration Ch 1 First Order Term	161	164	i	4	1	9		
Primary Calibration Ch 1 Zeroth Order Term	165	168	i	4	1	6		
Primary Calibration Ch 17 Second Order Term	169	172	i	4	1	12		
Primary Calibration Ch 17 First Order Term	173	176	i	4	1	9		
Primary Calibration Ch 17 Zeroth Order Term	177	180	i	4	1	6		
Primary Calibration Ch 2 Second Order Term	181	184	i	4	1	12		
Primary Calibration Ch 2 First Order Term	185	188	i	4	1	9		
Primary Calibration Ch 2 Zeroth Order Term	189	192	i	4	1	6		
Primary Calibration Ch 3 Second Order Term	193	196	i	4	1	12		
Primary Calibration Ch 3 First Order Term	197	200	i	4	1	9		
Primary Calibration Ch 3 Zeroth Order Term	201	204	i	4	1	6		
Primary Calibration Ch 13 Second Order Term	205	208	i	4	1	12		
Primary Calibration Ch 13 First Order Term	209	212	i	4	1	9		
Primary Calibration Ch 13 Zeroth Order Term	213	216	i	4	1	6		
Primary Calibration Ch 4 Second Order Term	217	220	i	4	1	12		
Primary Calibration Ch 4 First Order Term	221	224	i	4	1	9		
Primary Calibration Ch 4 Zeroth Order Term	225	228	i	4	1	6		
Primary Calibration Ch 18 Second Order Term	229	232	i	4	1	12		
Primary Calibration Ch 18 First Order Term	233	236	i	4	1	9		
Primary Calibration Ch 18 Zeroth Order Term	237	240	i	4	1	6		
Primary Calibration Ch 11 Second Order Term	241	244	i	4	1	12		
Primary Calibration Ch 11 First Order Term	245	248	i	4	1	9		
Primary Calibration Ch 11 Zeroth Order Term	249	252	i	4	1	6		
Primary Calibration Ch 19 Second Order Term	253	256	i	4	1	12		
Primary Calibration Ch 19 First Order Term	257	260	i	4	1	9		
Primary Calibration Ch 19 Zeroth Order Term	261	264	i	4	1	6		
Primary Calibration Ch 7 Second Order Term	265	268	i	4	1	12		
Primary Calibration Ch 7 First Order Term	269	272	i	4	1	9		
Primary Calibration Ch 7 Zeroth Order Term	273	276	i	4	1	6		
Primary Calibration Ch 8 Second Order Term	277	280	i	4	1	12		
Primary Calibration Ch 8 First Order Term	281	284	i	4	1	9		
Primary Calibration Ch 8 Zeroth Order Term	285	288	i	4	1	6		
Primary Calibration Ch 20 Second Order Term	289	292	i	4	1	12		
Primary Calibration Ch 20 First Order Term	293	296	i	4	1	9		
Primary Calibration Ch 20 Zeroth Order Term	297	300	i	4	1	6		
Primary Calibration Ch 10 Second Order Term	301	304	i	4	1	12		
Primary Calibration Ch 10 First Order Term	305	308	i	4	1	9		
Primary Calibration Ch 10 Zeroth Order Term	309	312	i	4	1	6		
Primary Calibration Ch 14 Second Order Term	313	316	i	4	1	12		
Primary Calibration Ch 14 First Order Term	317	320	i	4	1	9		
Primary Calibration Ch 14 Zeroth Order Term	321	324	i	4	1	6		
Primary Calibration Ch 6 Second Order Term	325	328	i	4	1	12		
Primary Calibration Ch 6 First Order Term	329	332	i	4	1	9		
Primary Calibration Ch 6 Zeroth Order Term	333	336	i	4	1	6		
Primary Calibration Ch 5 Second Order Term	337	340	i	4	1	12		
Primary Calibration Ch 5 First Order Term	341	344	i	4	1	9		
Primary Calibration Ch 5 Zeroth Order Term	345	348	i	4	1	6		
Primary Calibration Ch 15 Second Order Term	349	352	i	4	1	12		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Primary Calibration Ch 15 First Order Term	353	356	i	4	1	9		
Primary Calibration Ch 15 Zeroth Order Term	357	360	i	4	1	6		
Primary Calibration Ch 12 Second Order Term	361	364	i	4	1	12		
Primary Calibration Ch 12 First Order Term	365	368	i	4	1	9		
Primary Calibration Ch 12 Zeroth Order Term	369	372	i	4	1	6		
Primary Calibration Ch 16 Second Order Term	373	376	i	4	1	12		
Primary Calibration Ch 16 First Order Term	377	380	i	4	1	9		
Primary Calibration Ch 16 Zeroth Order Term	381	384	i	4	1	6		
Primary Calibration Ch 9 Second Order Term	385	388	i	4	1	12		
Primary Calibration Ch 9 First Order Term	389	392	i	4	1	9		
Primary Calibration Ch 9 Zeroth Order Term	393	396	i	4	1	6		
Spare Calibration Ch 1 Second Order Term	397	400	i	4	1	12		
Spare Calibration Ch 1 First Order Term	401	404	i	4	1	9		
Spare Calibration Ch 1 Zeroth Order Term	405	408	i	4	1	6		
Spare Calibration Ch 17 Second Order Term	409	412	i	4	1	12		
Spare Calibration Ch 17 First Order Term	413	416	i	4	1	9		
Spare Calibration Ch 17 Zeroth Order Term	417	420	i	4	1	6		
Spare Calibration Ch 2 Second Order Term	421	424	i	4	1	12		
Spare Calibration Ch 2 First Order Term	425	428	i	4	1	9		
Spare Calibration Ch 2 Zeroth Order Term	429	432	i	4	1	6		
Spare Calibration Ch 3 Second Order Term	433	436	i	4	1	12		
Spare Calibration Ch 3 First Order Term	437	440	i	4	1	9		
Spare Calibration Ch 3 Zeroth Order Term	441	444	i	4	1	6		
Spare Calibration Ch 13 Second Order Term	445	448	i	4	1	12		
Spare Calibration Ch 13 First Order Term	449	452	i	4	1	9		
Spare Calibration Ch 13 Zeroth Order Term	453	456	i	4	1	6		
Spare Calibration Ch 4 Second Order Term	457	460	i	4	1	12		
Spare Calibration Ch 4 First Order Term	461	464	i	4	1	9		
Spare Calibration Ch 4 Zeroth Order Term	465	468	i	4	1	6		
Spare Calibration Ch 18 Second Order Term	469	472	i	4	1	12		
Spare Calibration Ch 18 First Order Term	473	476	i	4	1	9		
Spare Calibration Ch 18 Zeroth Order Term	477	480	i	4	1	6		
Spare Calibration Ch 11 Second Order Term	481	484	i	4	1	12		
Spare Calibration Ch 11 First Order Term	485	488	i	4	1	9		
Spare Calibration Ch 11 Zeroth Order Term	489	492	i	4	1	6		
Spare Calibration Ch 19 Second Order Term	493	496	i	4	1	12		
Spare Calibration Ch 19 First Order Term	497	500	i	4	1	9		
Spare Calibration Ch 19 Zeroth Order Term	501	504	i	4	1	6		
Spare Calibration Ch 7 Second Order Term	505	508	i	4	1	12		
Spare Calibration Ch 7 First Order Term	509	512	i	4	1	9		
Spare Calibration Ch 7 Zeroth Order Term	513	516	i	4	1	6		
Spare Calibration Ch 8 Second Order Term	517	520	i	4	1	12		
Spare Calibration Ch 8 First Order Term	521	524	i	4	1	9		
Spare Calibration Ch 8 Zeroth Order Term	525	528	i	4	1	6		
Spare Calibration Ch 20 Second Order Term	529	532	i	4	1	12		
Spare Calibration Ch 20 First Order Term	533	536	i	4	1	9		
Spare Calibration Ch 20 Zeroth Order Term	537	540	i	4	1	6		
Spare Calibration Ch 10 Second Order Term	541	544	i	4	1	12		
Spare Calibration Ch 10 First Order Term	545	548	i	4	1	9		
Spare Calibration Ch 10 Zeroth Order Term	549	552	i	4	1	6		
Spare Calibration Ch 14 Second Order Term	553	556	i	4	1	12		
Spare Calibration Ch 14 First Order Term	557	560	i	4	1	9		
Spare Calibration Ch 14 Zeroth Order Term	561	564	i	4	1	6		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Spare Calibration Ch 6 Second Order Term	565	568	i	4	1	12		
Spare Calibration Ch 6 First Order Term	569	572	i	4	1	9		
Spare Calibration Ch 6 Zeroth Order Term	573	576	i	4	1	6		
Spare Calibration Ch 5 Second Order Term	577	580	i	4	1	12		
Spare Calibration Ch 5 First Order Term	581	584	i	4	1	9		
Spare Calibration Ch 5 Zeroth Order Term	585	588	i	4	1	6		
Spare Calibration Ch 15 Second Order Term	589	592	i	4	1	12		
Spare Calibration Ch 15 First Order Term	593	596	i	4	1	9		
Spare Calibration Ch 15 Zeroth Order Term	597	600	i	4	1	6		
Spare Calibration Ch 12 Second Order Term	601	604	i	4	1	12		
Spare Calibration Ch 12 First Order Term	605	608	i	4	1	9		
Spare Calibration Ch 12 Zeroth Order Term	609	612	i	4	1	6		
Spare Calibration Ch 16 Second Order Term	613	616	i	4	1	12		
Spare Calibration Ch 16 First Order Term	617	620	i	4	1	9		
Spare Calibration Ch 16 Zeroth Order Term	621	624	i	4	1	6		
Spare Calibration Ch 9 Second Order Term	625	628	i	4	1	12		
Spare Calibration Ch 9 First Order Term	629	632	i	4	1	9		
Spare Calibration Ch 9 Zeroth Order Term	633	636	i	4	1	6		
<Zero Fill>	637	648	i	4	3	0		
<b>NAVIGATION</b>								
Navigation Status Bit Field (except for bits 16-12, all other meaningful bits are NOAA specific; these bits will be zero filled for Metop)	649	652	u	4	1	0		
bits 31-17: <zero fill>								
bit 16: earth location corrected for Euler angles (0=FALSE; 1=TRUE)								
bits 15-12: earth location indicator (0=earth location available; 1=user ephemeris files greater than 24 hours old; 2=no earth location available)								
bits 11-8: spacecraft attitude control (0=operating in YGC or NOMINAL mode; 1=operating in another mode; 2=attitude exceeds nominal tolerance; 3=both 1 and 2)								
bits 7-4: attitude SMODE (0=nominal mode; 1=rate nulling mode; 2=YGC mode; 3=search mode; 4=coast mode)								
bits 3-0: attitude PWTIP\$AC (0=nominal mode/no test; 1=yaw axis test in progress; 2=roll axis test in progress; 3=pitch axis test in progress)								
Time Associated with Euler Angles (range: 0 - 4,294,967,295 (TBC))	653	656	u	4	1	0	seconds	
Euler Angles	657	662	i	2	3	3	degrees	
Word 1: Roll								
Word 2: Pitch								
Word 3: Yaw								
Spacecraft Altitude above Reference Ellipsoid	663	664	u	2	1	1	kilometers	
Angular Relationships (local azimuth range +/- 180.00 degrees)	665	1000	i	2	168	2	degrees	
Word 1: Solar zenith angle, FOV 1								
Word 2: Satellite zenith angle, FOV 1								
Word 3: Local azimuth angle, FOV 1								
Word 4: Solar zenith angle, FOV 2								
...								
(set of 3 angles every FOV)								
...								
Word 168: Local azimuth angle, FOV 56								
Earth Location (north latitude and east longitude are positive)	1001	1448	i	4	112	4	degrees	
Word 1: Latitude, FOV 1								
Word 2: Longitude, FOV 1								
Word 3: Latitude, FOV 2								
...								
(lat/lon word pair every FOV)								
...								
Word 112: Longitude, FOV 56								

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<Zero Fill>	1449	1456	i	4	2	0		
<b>HIRS DATA ELEMENTS</b>								
Header for Element 0 ( <i>same format through element 63</i> ) bits 31-24: scan encoder position bits 23-19: electronic cal level indicator bits 18-13: <zero fill> bits 12-7: channel 1 period monitor bits 6-1: element number bit 0: filter sync designator	1457	1460	u	4	1	0		
Radiometric Data for Element 0 ( <i>same format through element 55</i> ) <i>NOTE: To unpack a channel's 2-byte, radiometric reading, subtract 4,096 from it--i.e., "u = p - 4096", where 'p' is the channel's reading as stored in the 1b (described below), and 'u' is the unpacked reading.</i> <i>Word 1: Channel 1</i> bits 15-13: <zero fill> bit 12: inverted sign bit (0=negative) bits 11-0: radiant signal amplitude	1461	1500	u	2	20	0	counts	
<i>Words 2-20: Channels 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9 (in order)</i>								
Bit Flags for Element 0 ( <i>same format through element 63</i> ) bit 15: valid data flag (0=ignore data; 1=good data) bit 14: odd bit parity bits 13-0: <zero fill>	1501	1502	u	2	1	0		
<Zero Fill>	1503	1504	i	2	1	0		
Header for Element 1	1505	1508	u	4	1	0		
Radiometric Data for Element 1	1509	1548	u	2	20	0	counts	
Bit Flags for Element 1	1549	1550	u	2	1	0		
<Zero Fill>	1551	1552	i	2	1	0		
Header for Element 2	1553	1556	u	4	1	0		
Radiometric Data for Element 2	1557	1596	u	2	20	0	counts	
Bit Flags for Element 2	1597	1598	u	2	1	0		
<Zero Fill>	1599	1600	i	2	1	0		
Header for Element 3	1601	1604	u	4	1	0		
Radiometric Data for Element 3	1605	1644	u	2	20	0	counts	
Bit Flags for Element 3	1645	1646	u	2	1	0		
<Zero Fill>	1647	1648	i	2	1	0		
Header for Element 4	1649	1652	u	4	1	0		
Radiometric Data for Element 4	1653	1692	u	2	20	0	counts	
Bit Flags for Element 4	1693	1694	u	2	1	0		
<Zero Fill>	1695	1696	i	2	1	0		
Header for Element 5	1697	1700	u	4	1	0		
Radiometric Data for Element 5	1701	1740	u	2	20	0	counts	
Bit Flags for Element 5	1741	1742	u	2	1	0		
<Zero Fill>	1743	1744	i	2	1	0		
Header for Element 6	1745	1748	u	4	1	0		
Radiometric Data for Element 6	1749	1788	u	2	20	0	counts	
Bit Flags for Element 6	1789	1790	u	2	1	0		
<Zero Fill>	1791	1792	i	2	1	0		
Header for Element 7	1793	1796	u	4	1	0		
Radiometric Data for Element 7	1797	1836	u	2	20	0	counts	
Bit Flags for Element 7	1837	1838	u	2	1	0		
<Zero Fill>	1839	1840	i	2	1	0		
Header for Element 8	1841	1844	u	4	1	0		
Radiometric Data for Element 8	1845	1884	u	2	20	0	counts	

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Flags for Element 8	1885	1886	u	2	1	0		
<Zero Fill>	1887	1888	i	2	1	0		
Header for Element 9	1889	1892	u	4	1	0		
Radiometric Data for Element 9	1893	1932	u	2	20	0counts		
Bit Flags for Element 9	1933	1934	u	2	1	0		
<Zero Fill>	1935	1936	i	2	1	0		
Header for Element 10	1937	1940	u	4	1	0		
Radiometric Data for Element 10	1941	1980	u	2	20	0counts		
Bit Flags for Element 10	1981	1982	u	2	1	0		
<Zero Fill>	1983	1984	i	2	1	0		
Header for Element 11	1985	1988	u	4	1	0		
Radiometric Data for Element 11	1989	2028	u	2	20	0counts		
Bit Flags for Element 11	2029	2030	u	2	1	0		
<Zero Fill>	2031	2032	i	2	1	0		
Header for Element 12	2033	2036	u	4	1	0		
Radiometric Data for Element 12	2037	2076	u	2	20	0counts		
Bit Flags for Element 12	2077	2078	u	2	1	0		
<Zero Fill>	2079	2080	i	2	1	0		
Header for Element 13	2081	2084	u	4	1	0		
Radiometric Data for Element 13	2085	2124	u	2	20	0counts		
Bit Flags for Element 13	2125	2126	u	2	1	0		
<Zero Fill>	2127	2128	i	2	1	0		
Header for Element 14	2129	2132	u	4	1	0		
Radiometric Data for Element 14	2133	2172	u	2	20	0counts		
Bit Flags for Element 14	2173	2174	u	2	1	0		
<Zero Fill>	2175	2176	i	2	1	0		
Header for Element 15	2177	2180	u	4	1	0		
Radiometric Data for Element 15	2181	2220	u	2	20	0counts		
Bit Flags for Element 15	2221	2222	u	2	1	0		
<Zero Fill>	2223	2224	i	2	1	0		
Header for Element 16	2225	2228	u	4	1	0		
Radiometric Data for Element 16	2229	2268	u	2	20	0counts		
Bit Flags for Element 16	2269	2270	u	2	1	0		
<Zero Fill>	2271	2272	i	2	1	0		
Header for Element 17	2273	2276	u	4	1	0		
Radiometric Data for Element 17	2277	2316	u	2	20	0counts		
Bit Flags for Element 17	2317	2318	u	2	1	0		
<Zero Fill>	2319	2320	i	2	1	0		
Header for Element 18	2321	2324	u	4	1	0		
Radiometric Data for Element 18	2325	2364	u	2	20	0counts		
Bit Flags for Element 18	2365	2366	u	2	1	0		
<Zero Fill>	2367	2368	i	2	1	0		
Header for Element 19	2369	2372	u	4	1	0		
Radiometric Data for Element 19	2373	2412	u	2	20	0counts		
Bit Flags for Element 19	2413	2414	u	2	1	0		
<Zero Fill>	2415	2416	i	2	1	0		
Header for Element 20	2417	2420	u	4	1	0		
Radiometric Data for Element 20	2421	2460	u	2	20	0counts		
Bit Flags for Element 20	2461	2462	u	2	1	0		
<Zero Fill>	2463	2464	i	2	1	0		
Header for Element 21	2465	2468	u	4	1	0		
Radiometric Data for Element 21	2469	2508	u	2	20	0counts		
Bit Flags for Element 21	2509	2510	u	2	1	0		

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## DRAFT

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<Zero Fill>	2511	2512	i	2	1	0		
Header for Element 22	2513	2516	u	4	1	0		
Radiometric Data for Element 22	2517	2556	u	2	20	0counts		
Bit Flags for Element 22	2557	2558	u	2	1	0		
<Zero Fill>	2559	2560	i	2	1	0		
Header for Element 23	2561	2564	u	4	1	0		
Radiometric Data for Element 23	2565	2604	u	2	20	0counts		
Bit Flags for Element 23	2605	2606	u	2	1	0		
<Zero Fill>	2607	2608	i	2	1	0		
Header for Element 24	2609	2612	u	4	1	0		
Radiometric Data for Element 24	2613	2652	u	2	20	0counts		
Bit Flags for Element 24	2653	2654	u	2	1	0		
<Zero Fill>	2655	2656	i	2	1	0		
Header for Element 25	2657	2660	u	4	1	0		
Radiometric Data for Element 25	2661	2700	u	2	20	0counts		
Bit Flags for Element 25	2701	2702	u	2	1	0		
<Zero Fill>	2703	2704	i	2	1	0		
Header for Element 26	2705	2708	u	4	1	0		
Radiometric Data for Element 26	2709	2748	u	2	20	0counts		
Bit Flags for Element 26	2749	2750	u	2	1	0		
<Zero Fill>	2751	2752	i	2	1	0		
Header for Element 27	2753	2756	u	4	1	0		
Radiometric Data for Element 27	2757	2796	u	2	20	0counts		
Bit Flags for Element 27	2797	2798	u	2	1	0		
<Zero Fill>	2799	2800	i	2	1	0		
Header for Element 28	2801	2804	u	4	1	0		
Radiometric Data for Element 28	2805	2844	u	2	20	0counts		
Bit Flags for Element 28	2845	2846	u	2	1	0		
<Zero Fill>	2847	2848	i	2	1	0		
Header for Element 29	2849	2852	u	4	1	0		
Radiometric Data for Element 29	2853	2892	u	2	20	0counts		
Bit Flags for Element 29	2893	2894	u	2	1	0		
<Zero Fill>	2895	2896	i	2	1	0		
Header for Element 30	2897	2900	u	4	1	0		
Radiometric Data for Element 30	2901	2940	u	2	20	0counts		
Bit Flags for Element 30	2941	2942	u	2	1	0		
<Zero Fill>	2943	2944	i	2	1	0		
Header for Element 31	2945	2948	u	4	1	0		
Radiometric Data for Element 31	2949	2988	u	2	20	0counts		
Bit Flags for Element 31	2989	2990	u	2	1	0		
<Zero Fill>	2991	2992	i	2	1	0		
Header for Element 32	2993	2996	u	4	1	0		
Radiometric Data for Element 32	2997	3036	u	2	20	0counts		
Bit Flags for Element 33	3037	3038	u	2	1	0		
<Zero Fill>	3039	3040	i	2	1	0		
Header for Element 33	3041	3044	u	4	1	0		
Radiometric Data for Element 33	3045	3084	u	2	20	0counts		
Bit Flags for Element 33	3085	3086	u	2	1	0		
<Zero Fill>	3087	3088	i	2	1	0		
Header for Element 34	3089	3092	u	4	1	0		
Radiometric Data for Element 34	3093	3132	u	2	20	0counts		
Bit Flags for Element 34	3133	3134	u	2	1	0		
<Zero Fill>	3135	3136	i	2	1	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Header for Element 35	3137	3140	u	4	1	0		
Radiometric Data for Element 35	3141	3180	u	2	20	0	counts	
Bit Flags for Element 35	3181	3182	u	2	1	0		
<Zero Fill>	3183	3184	i	2	1	0		
Header for Element 36	3185	3188	u	4	1	0		
Radiometric Data for Element 36	3189	3228	u	2	20	0	counts	
Bit Flags for Element 36	3229	3230	u	2	1	0		
<Zero Fill>	3231	3232	i	2	1	0		
Header for Element 37	3233	3236	u	4	1	0		
Radiometric Data for Element 37	3237	3276	u	2	20	0	counts	
Bit Flags for Element 37	3277	3278	u	2	1	0		
<Zero Fill>	3279	3280	i	2	1	0		
Header for Element 38	3281	3284	u	4	1	0		
Radiometric Data for Element 38	3285	3324	u	2	20	0	counts	
Bit Flags for Element 38	3325	3326	u	2	1	0		
<Zero Fill>	3327	3328	i	2	1	0		
Header for Element 39	3329	3332	u	4	1	0		
Radiometric Data for Element 39	3333	3372	u	2	20	0	counts	
Bit Flags for Element 39	3373	3374	u	2	1	0		
<Zero Fill>	3375	3376	i	2	1	0		
Header for Element 40	3377	3380	u	4	1	0		
Radiometric Data for Element 40	3381	3420	u	2	20	0	counts	
Bit Flags for Element 40	3421	3422	u	2	1	0		
<Zero Fill>	3423	3424	i	2	1	0		
Header for Element 41	3425	3428	u	4	1	0		
Radiometric Data for Element 41	3429	3468	u	2	20	0	counts	
Bit Flags for Element 41	3469	3470	u	2	1	0		
<Zero Fill>	3471	3472	i	2	1	0		
Header for Element 42	3473	3476	u	4	1	0		
Radiometric Data for Element 42	3477	3516	u	2	20	0	counts	
Bit Flags for Element 42	3517	3518	u	2	1	0		
<Zero Fill>	3519	3520	i	2	1	0		
Header for Element 43	3521	3524	u	4	1	0		
Radiometric Data for Element 43	3525	3564	u	2	20	0	counts	
Bit Flags for Element 43	3565	3566	u	2	1	0		
<Zero Fill>	3567	3568	i	2	1	0		
Header for Element 44	3569	3572	u	4	1	0		
Radiometric Data for Element 44	3573	3612	u	2	20	0	counts	
Bit Flags for Element 44	3613	3614	u	2	1	0		
<Zero Fill>	3615	3616	i	2	1	0		
Header for Element 45	3617	3620	u	4	1	0		
Radiometric Data for Element 45	3621	3660	u	2	20	0	counts	
Bit Flags for Element 45	3661	3662	u	2	1	0		
<Zero Fill>	3663	3664	i	2	1	0		
Header for Element 46	3665	3668	u	4	1	0		
Radiometric Data for Element 46	3669	3708	u	2	20	0	counts	
Bit Flags for Element 46	3709	3710	u	2	1	0		
<Zero Fill>	3711	3712	i	2	1	0		
Header for Element 47	3713	3716	u	4	1	0		
Radiometric Data for Element 47	3717	3756	u	2	20	0	counts	
Bit Flags for Element 47	3757	3758	u	2	1	0		
<Zero Fill>	3759	3760	i	2	1	0		
Header for Element 48	3761	3764	u	4	1	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Radiometric Data for Element 48	3765	3804	u	2	20	0	counts	
Bit Flags for Element 48	3805	3806	u	2	1	0		
<Zero Fill>	3807	3808	i	2	1	0		
Header for Element 49	3809	3812	u	4	1	0		
Radiometric Data for Element 49	3813	3852	u	2	20	0	counts	
Bit Flags for Element 49	3853	3854	u	2	1	0		
<Zero Fill>	3855	3856	i	2	1	0		
Header for Element 50	3857	3860	u	4	1	0		
Radiometric Data for Element 50	3861	3900	u	2	20	0	counts	
Bit Flags for Element 50	3901	3902	u	2	1	0		
<Zero Fill>	3903	3904	i	2	1	0		
Header for Element 51	3905	3908	u	4	1	0		
Radiometric Data for Element 51	3909	3948	u	2	20	0	counts	
Bit Flags for Element 51	3949	3950	u	2	1	0		
<Zero Fill>	3951	3952	i	2	1	0		
Header for Element 52	3953	3956	u	4	1	0		
Radiometric Data for Element 52	3957	3996	u	2	20	0	counts	
Bit Flags for Element 52	3997	3998	u	2	1	0		
<Zero Fill>	3999	4000	i	2	1	0		
Header for Element 53	4001	4004	u	4	1	0		
Radiometric Data for Element 53	4005	4044	u	2	20	0	counts	
Bit Flags for Element 53	4045	4046	u	2	1	0		
<Zero Fill>	4047	4048	i	2	1	0		
Header for Element 54	4049	4052	u	4	1	0		
Radiometric Data for Element 54	4053	4092	u	2	20	0	counts	
Bit Flags for Element 54	4093	4094	u	2	1	0		
<Zero Fill>	4095	4096	i	2	1	0		
Header for Element 55	4097	4100	u	4	1	0		
Radiometric Data for Element 55	4101	4140	u	2	20	0	counts	
Bit Flags for Element 55	4141	4142	u	2	1	0		
<Zero Fill>	4143	4144	i	2	1	0		
Header for Element 56	4145	4148	u	4	1	0		
Positive Calibration	4149	4188	u	2	20	0	counts	
Word 1: Channel 1								
Words 2-20: Channels 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9 (in order)								
Bit Flags for Element 56	4189	4190	u	2	1	0		
<Zero Fill>	4191	4192	i	2	1	0		
Header for Element 57	4193	4196	u	4	1	0		
Negative Calibration	4197	4236	u	2	20	0	counts	
Word 1: Channel 1								
Words 2-20: Channels 17, 2, 3, 13, 4, 18, 11, 19, 7, 8, 20, 10, 14, 6, 5, 15, 12, 16, 9 (in order)								
Bit Flags for Element 57	4237	4238	u	2	1	0		
<Zero Fill>	4239	4240	i	2	1	0		
Header for Element 58	4241	4244	u	4	1	0		
Internal Warm Target, Temperature Sensor #1 ( <i>zero fill in commanded position modes</i> )	4245	4254	i	2	5	0	counts	
Word 1: Reading 1								
...								
Word 5: Reading 5								

## DRAFT

## DRAFT

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Internal Warm Target, Temperature Sensor #2 ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4255	4264	i	2	5	0	counts	
Internal Warm Target, Temperature Sensor #3 ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4265	4274	i	2	5	0	counts	
Internal Warm Target, Temperature Sensor #4 ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4275	4284	i	2	5	0	counts	
Bit Flags for Element 58 <Zero Fill>	4285	4286	u	2	1	0		
Header for Element 59	4287	4288	i	2	1	0		
Internal Cold Target, Temperature Sensor #1 ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4293	4302	i	2	5	0	counts	
Analog Ground 3 ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4303	4312	i	2	5	0	counts	
Internal Warm Target, Temperature Sensor #5 ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4313	4322	i	2	5	0	counts	
Tertiary Telescope Temperature Sensor ( <i>zero fill in commanded position modes</i> ) Word 1: Reading 1 ... Word 5: Reading 5	4323	4332	i	2	5	0	counts	
Bit Flags for Element 59 <Zero Fill>	4333	4334	u	2	1	0		
Header for Element 60	4335	4336	i	2	1	0		
Filter Wheel Housing, Temperature Sensor #1 Word 1: Reading 1 ... Word 5: Reading 5	4337	4340	u	4	1	0		
Filter Wheel Housing, Temperature Sensor #1 Word 1: Reading 1 ... Word 5: Reading 5	4341	4350	i	2	5	0	counts	
Filter Wheel Housing, Temperature Sensor #2 Word 1: Reading 1 ... Word 5: Reading 5	4351	4360	i	2	5	0	counts	
Filter Wheel Housing, Temperature Sensor #3 Word 1: Reading 1 ... Word 5: Reading 5	4361	4370	i	2	5	0	counts	
Filter Wheel Housing, Temperature Sensor #4 Word 1: Reading 1 ... Word 5: Reading 5	4371	4380	i	2	5	0	counts	
Bit Flags for Element 60 <Zero Fill>	4381	4382	u	2	1	0		
Header for Element 61	4383	4384	i	2	1	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Patch Temperature (Expanded Scale)	4389	4398	i	2	5	0	counts	
Word 1: Reading 1								
...								
Word 5: Reading 5								
First Stage Radiator Temperature Sensor	4399	4408	i	2	5	0	counts	
Word 1: Reading 1								
...								
Word 5: Reading 5								
Filter Wheel Housing Heater Current	4409	4418	i	2	5	0	counts	
Word 1: Reading 1								
...								
Word 5: Reading 5								
Electronic Calibration Digital to Analog Converter	4419	4428	i	2	5	0	counts	
Word 1: Reading 1								
...								
Word 5: Reading 5								
Bit Flags for Element 61	4429	4430	u	2	1	0		
<Zero Fill>	4431	4432	i	2	1	0		
Header for Element 62	4433	4436	u	4	1	0		
Scan Mirror Temperature	4437	4438	i	2	1	0	counts	
Primary Telescope Temperature	4439	4440	i	2	1	0	counts	
Secondary Telescope Temperature	4441	4442	i	2	1	0	counts	
Baseplate Temperature	4443	4444	i	2	1	0	counts	
Electronics Temperature	4445	4446	i	2	1	0	counts	
Patch Temperature Full Range	4447	4448	i	2	1	0	counts	
Scan Motor Temperature	4449	4450	i	2	1	0	counts	
Filter Wheel Motor Temperature	4451	4452	i	2	1	0	counts	
Cooler Housing Temperature	4453	4454	i	2	1	0	counts	
Patch Control Power	4455	4456	i	2	1	0	counts	
Scan Motor Current	4457	4458	i	2	1	0	counts	
Filter Motor Current	4459	4460	i	2	1	0	counts	
+15 VDC	4461	4462	i	2	1	0	counts	
-15 VDC	4463	4464	i	2	1	0	counts	
+7.5 VDC	4465	4466	i	2	1	0	counts	
-7.5 VDC	4467	4468	i	2	1	0	counts	
+10 VDC	4469	4470	i	2	1	0	counts	
+5 VDC	4471	4472	i	2	1	0	counts	
Analog Ground 1	4473	4474	i	2	1	0	counts	
Analog Ground 2	4475	4476	i	2	1	0	counts	
Bit Flags for Element 62	4477	4478	u	2	1	0		
<Zero Fill>	4479	4480	i	2	1	0		
Header for Element 63	4481	4484	u	4	1	0		
Line Counter ( <i>number of lines from the last auto calibration sequence</i> )	4485	4486	u	2	1	0		
First Status Word bits 15-13: <zero fill> bits 12-8: instrument serial number bit 7: instrument (0=off; 1=on) bit 6: scan motor (0=on; 1=off) bit 5: filter wheel (0=on; 1=off) bit 4: electronics (0=off; 1=on) bit 3: cooler heat (0=on; 1=off) bit 2: internal warm target position (0=true; 1=false) bit 1: internal cold target position (0=true; 1=false) bit 0: space position (0=true; 1=false)	4487	4488	u	2	1	0		6

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
Second Status Word bit 15-8: <zero fill> bit 7: nadir position (0=true; 1=false) bit 6: calibration (0=enabled; 1=disabled) bit 5: cooler door release (0=enabled; 1=disabled) bit 4: cooler door open (0=no; 1=yes) bit 3: cooler door closed (0=no; 1=yes) bit 2: filter housing heat (0=on; 1=off) bit 1: patch temperature control (0=on; 1=off) bit 0: filter motor power (0=high; 1=normal)	4489	4490	u	2	1	0		
Data Verification Binary Code Words 1-17: +3875, +1443, -1522, -1882, -1631, -1141, +1125, +3655, -2886, -3044, -3764, -3262, -2283, -2251, +3214, +1676, +1992	4491	4524	u	2	17	0		
Bit Flags for Element 63 <Zero Fill>	4525	4526	u	2	1	0		
<b>DIGITAL B HOUSEKEEPING TELEMETRY</b> Digital B Telemetry Update Flags ( <i>If bit = 0, associated telemetry item is up-to-date. If bit = 1, associated telemetry item was not updated during most recent telemetry cycle - possibly due to lost frame.</i> ) bit 15: instrument power bit 14: electronics power bit 13: filter motor power bit 12: scan motor power bit 11: cooler heater bit 10: filter housing heater bit 9: cooler door release bit 8: cooler window heater bit 7: go to nadir position bit 6: calibration sequence bit 5: cooler door closed bit 4: cooler door fully open bit 3: filter motor power level bit 2: patch temperature controller bits 1-0: <zero fill>	4541	4542	u	2	1	0		
Digital B Data bit 15: instrument power (0=off; 1=on) bit 14: electronics power (0=off; 1=on) bit 13: filter motor power (0=off; 1=on) bit 12: scan motor power (0=off; 1=on) bit 11: cooler heater (0=off; 1=on) bit 10: filter housing heater (0=off; 1=on) bit 9: cooler door release (0=disabled; 1=enabled) bit 8: cooler window heater (0=on; 1=off) bit 7: go to nadir position (0=no; 1=yes/initiated) bit 6: calibration sequence (0=disabled; 1=enabled) bit 5: cooler door closed (0=yes; 1=no) bit 4: cooler door fully open (0=yes; 1=no) bit 3: filter motor power level (0=normal; 1=high) bit 2: patch temperature controller (0=off; 1=on) bits 1-0: <zero fill>	4543	4544	u	2	1	0		

Field Name	Start Octet	End Octet	Data Type	Word Size	Number of Words	Scale Factor	Units	Notes
<b>ANALOG HOUSEKEEPING TELEMETRY</b>								
Analog Telemetry Update Flags (If bit = 0, associated telemetry item is up-to-date. If bit = 1, associated telemetry item was not updated during most recent telemetry cycle - possibly due to lost frame.) bits 31-17: <zero fill> bit 16: patch controller power bit 15: scan motor current bit 14: filter wheel motor current bit 13: -15 VDC monitor bit 12: +15 VDC monitor bit 11: -7.5 VDC TLM/DC/DC conv. bit 10: +7.5 VDC TLM/DC/DC conv. bit 9: +10V VDC TLM/DC/DC conv. bit 8: +5 VDC monitor bit 7: filter wheel motor temperature bit 6: scan motor temperature bit 5: filter housing controller current bit 4: patch temperature bit 3: electronics temperature bit 2: base plate temperature bit 1: radiator temperature bit 0: <zero fill>	4545	4548	u	4	1	0		
Radiator Temperature (range: 0 - 255)	4549	4549	u	1	1	0	counts	
Base Plate Temperature (range: 0 - 255)	4550	4550	u	1	1	0	counts	
Electronics Temperature (range: 0 - 255)	4551	4551	u	1	1	0	counts	
Patch Temperature (range: 0 - 255)	4552	4552	u	1	1	0	counts	
Filter Housing Controller Current (range: 0 - 255)	4553	4553	u	1	1	0	counts	
Scan Motor Temperature (range: 0 - 255)	4554	4554	u	1	1	0	counts	
Filter Wheel Motor Temperature (range: 0 - 255)	4555	4555	u	1	1	0	counts	
+5 VDC Monitor (range: 0 - 255)	4556	4556	u	1	1	0	counts	
+10V VDC TLM/DC/DC Conv. (range: 0 - 255)	4557	4557	u	1	1	0	counts	
+7.5 VDC TLM/DC/DC Conv. (range: 0 - 255)	4558	4558	u	1	1	0	counts	
-7.5 VDC TLM/DC/DC Conv. (range: 0 - 255)	4559	4559	u	1	1	0	counts	
+15 VDC Monitor (range: 0 - 255)	4560	4560	u	1	1	0	counts	
-15 VDC Monitor (range: 0 - 255)	4561	4561	u	1	1	0	counts	
Filter Wheel Motor Current (range: 0 - 255)	4562	4562	u	1	1	0	counts	
Scan Motor Current (range: 0 - 255)	4563	4563	u	1	1	0	counts	
Patch Controller Power (range: 0 - 255)	4564	4564	u	1	1	0	counts	
<b>FILLER</b>								
<Zero Fill>	4565	4608	i	4	11	0		

## **5 Notes**

- 1) The scale factors shown for the analog telemetry conversion coefficients are TBC. They are based on coefficients from old documentation. When updated documentation is available, these may change.

## 6 Acronyms

ASCII	American Standard Code for Information Interchange
AU	Astronomical Unit
C	Celsius
cm	centimeter
CPIDS	Calibration Parameters Input Data Set
DC	Direct Current
FOV	Field Of View
GAC	Global Area Coverage
HIRS	High-Resolution Infrared Radiation Sounder
HRPT	High Resolution Picture Transmission
IJPS	Initial Joint Polar-orbiting Operational Satellite System
LAC	Local Area Coverage
Metop	Meteorological Operational Satellite
NOAA	National Oceanic and Atmospheric Administration
PACS	Polar Acquisition and Control Subsystem
PRT	Platinum Resistance Thermometer
QC	Quality Control
TBC	To Be Confirmed
TBD	To Be Determined
TIP	TIROS Information Processor
TLM	Telemetry
UTC	Universal Time Coordinated
VDC	Volts Direct Current
YGC	Yaw Gyrocompassing